May
2021

Fire Line Newsletter

In This Issue:

From the Balcony

You often hear in sports, coaches describing a hard-fought victory as truly a team win. In other words, the win cannot be tied to one player or a single part of the contest, but rather the team was responsible for the victory and that's how I felt Tuesday night after hearing we successfully engaged our voters to support our referendum. Our push was coordinated, intense, factual, and we didn't leave anything on the table. We gave 100% and the outcome was reflective of our effort. Each member of FDLFR should feel strong and full of gratitude for the trust our citizens showed us; you've earned it! In the coming months we will begin to formulate plans on how we will incorporate the 4th ambulance into our daily routine; stay tuned for more in the coming months. We will have a sizable recruitment which will also take time and energy from all of you to train up six new probationary members. It will be exciting and exhausting, but our team will make it happen.

Assistant Chiefs Janquart, Gerritson and I returned from the final inspection of our new ambulance which replaced the one damaged in the high impact crash last year. We were able to work with our dealer and the manufacturer to get the order expedited; I am sure when you see it, you too will be impressed. We have our regularly scheduled replacement for 2021 on order and we should be seeing that ambulance sometime in November.

We started off April bidding fond farewell to Don Salvaggio who retired after 26 years of service. Many braved the cold as members of our honor guard presented him with the American Flag. Don also received "The Key To The City" as a token of the City's appreciation of his longtime service.

The following Monday, we welcomed our newest recruit, Noah Lorenz who is a local Fond du Lac native and graduate of WLA in Fond du Lac. We are happy to have Noah with us and we wish him many years of success.

In closing, contractors have begun work on construction of station one's training room addition. We suspect this project will take a good part of the summer to complete, but when finished it will double our square footage in the room and provide more options for the room to be utilized more frequently. Later this summer the front apparatus drive at station one will be replaced. We have a busy summer ahead; buckle up, it's going to be a wild ride.

Until Next Month,
Be Safe and
Be Well

Fire Chief
Peter O'Leary

Fire is Everyone's Fight™

FOND DU LAC FIRE RESCUE OPERATIONS

By: Assistant Chief
Erick Gerritson

Post-incident Analysis: Getting the most out of an after-incident critique makes firefighters and the department better

One of the most important areas of personal development for any firefighter is participation in the after-action critique. Regardless of the success or challenges encountered in an emergency, effectively illuminating its resolution is a giant step in advancing policy and procedures, training and education, and the real meaning of teamwork and collective accomplishment.

Exactly what you and your department determine is the best way to conduct such an analysis can mean the difference between a progressive, proactive experience and one that flounders in second-guesses and finger-pointing.

The following basic principles of a successful critique will go a long way to formulating a productive and successful process.

INCIDENT DEBRIEF MEDIATOR

Selecting the right facilitator for a critique is critical to its overall success. The person selected should be experienced, objective for the particular incident to be reviewed and democratic in their approach to discussion. A good critique officer is one who can create the scene – weather, incident environment, equipment configuration and general assignments. Whether on a screen or a white board, an organized narrator equipped with a site layout can go a long way in providing a foundation for effective discussion.

GROUND RULES

The stage should be set, whether in a standard operating procedure, a formal declaration of the ranking officer or by the facilitator at the time of the incident review. A respect for rules, a sense of order and acknowledging appropriate behavior, combine to create a decorum that is essential to an effective review. Expressed frustrations and even displays of anger are totally unacceptable during these critiques. Integrity of purpose should keep you on track – most of the time.

ANALYZE THE EMERGENCY RESPONSE PROCESS, NOT PEOPLE

The underlying principle for conducting a review is that it is all about the process and not about the people, with the exception of performance recognition. The words used to discuss the incident can influence the quality of the process. When analyzing an incident, use terms like challenges instead of problems, lessons learned rather than mistakes made, and always remember that critique is not another word for criticism. Instead of berating a crew for losing an exposure, a discussion of the challenges faced defending the adjacent building will lead to an open learning environment and further discussion.

IMPROVING FIREFIGHTER SAFETY

We obsess about every emergency response. It is in our nature. Second-guessing, what ifs and an eclectic group of theories permeate every back-bay and kitchen-table discussion for days after a high-energy incident response – and for good reason. Learning from our experiences is a critical component to how firefighters make themselves, their teammates and their department better. Taking this one step further requires that if you have something to say, you have an obligation to contribute in a critique.

FIREFIGHTER'S ROLE

As a firefighter adding to a critique, you must be aware of the format and speak when it is appropriate. Be objective and limit your point of view to what you know while acknowledging your biases. Clarify misconceptions, describe changing environments and create a measurable view of the work that was accomplished. Explain what you experienced and how it added to or subtracted from the tactical objective you were assigned. Asking about how your tactical involvement related to the overall strategy is a valid question.

Post-Incident Analysis: Getting the most out of an after-incident critique
Continued

LEADERSHIP'S RESPONSIBILITY

Officers, too, have a role in promoting an open atmosphere of acceptance and discussion during any critique. There are several questions officers must ask during an after-incident critique.

- Was the action plan followed and why or why not?
- Were there gaps in the tactics and did they affect the strategic progression of the response?
- Were there enough resources and were they the correct ones for the tasks?
- Could anything have been done differently?
- Was any action seen as unsafe?
- What have we learned and what needs to change?

TRAINING OPPORTUNITY

Not knowing something is not the crime, but not teaching what you know is. When it comes to training, patience and the Socratic Method will advance the critique when appropriate and effectively allow lessons to be learned. The rule here is to be careful not to get bogged down in teachable moments. The ultimate goal of a critique is to solicit feedback in a structured format for the purpose of advancing operational development.

It doesn't matter whether you call it a post-incident analysis, an after-action review or simply a debriefing. The critique of any emergency response is a fundamental factor for promoting progress in your department. The opportunity to discuss strategies and the real-life tactics used to advance them are vital to your organization's moving forward. Knowing that every participant, regardless of job or rank, has an equal chance to express their questions and concerns as well as their appreciation, generates an abiding trust in each other while directly enhancing the prospect for success on the next call.

Source; Jim Spell from firerescue1.com

Until next month, Stay Safe!

Operations by the Numbers

March, 2020	By Month		Year-To-Date	
PREVENTION	**Last Year**	**This Year**	**Last Year**	**This Year**
Total Inspections	225	306	756	795
Total Defects	161	148	500	364
SUPPRESSION				
Alarms Involving Fire	8	12	27	28
Fire Mutual Aid Given	2	4	8	7
Fire Mutual Aid Received	0	3	0	5
Service/Good Intent Calls	37	42	133	122
False Alarms/False Calls	24	22	69	73
Other Calls	8	12	28	27
Total Fire Alarms & Calls	77	88	257	250
EMS				
Total Ambulance Calls	442	503	1485	1508
Total Fire/EMS Responses	519	591	1742	1758
Fire Property Loss	$45,000.00	$86,500.00	$191,000.00	$197,263.00
Fire Contents Loss	$3,001.00	$39,450.00	$91,001.00	$96,950.00
Engine Assisted EMS Calls	200	193	626	603

The Code Summary

By: Assistant Chief Todd Janquart

Expanding Critical Thinking in EMS Beyond Clinical Thinking

Authored by: Radu Venter, JEMS.com

When thinking about a topic, the first step is to define relevant terms to avoid misconceptions. The definition of critical thinking is "a persistent effort to examine any belief or supposed form of knowledge in the light of the evidence that supports it and the further conclusions to which it tends." The key word in this definition is "any," revealing a short-sightedness in our perception of critical thinking.

Currently, attempts to improve critical thinking skills largely focus on our ability to think through a patient's medical concern, a process I have termed clinical thinking. This is a small, but significant nuance, and one I failed to note in my first article. In this article, I hope to expand on what I mean by clinical thinking and why the world of EMS thought is much larger than we believe it is.

What is Clinical Thinking?

Clinical thinking encompasses the cognitive skills paramedics use as they manage a patient. Faced with a chief complaint the paramedic must complete appropriate assessments, create a differential diagnosis, and develop an appropriate treatment plan. . Clinical thinking is present throughout, as the paramedic selects relevant assessments to conduct and compiles the objective and subjective information generated to create a differential diagnosis.

From there, the paramedic must create an appropriate treatment plan and prioritize the care needed. The process then repeats as necessary based on the effects of treatments or changes in the patient's condition until transfer of care at the hospital.

Effective clinical thinking, as I argued in my previous article, is dependent on a strong foundation of knowledge and the development and correct application of thinking skills. A paramedic must be able to sort through the list of available therapies to select only those appropriate to the situation. Equally important, the paramedic must withhold potentially detrimental treatments.

As the paramedic's scope of practice increases, there must be a proportional increase in the level of foundational knowledge and clinical thinking skills. Given that this is the main role of a paramedic, it is not surprising that most articles catering to paramedics focus on developing clinical knowledge or clinical thinking skills.

How Can We Apply Critical Thinking Beyond Clinical Thinking?

Focusing critical thinking on clinical matters neglects other important fields. As Joe Y.F Lau notes, critical thinking "is a domain-general skill." The earlier definition supports this stance. Expanding thinking in EMS beyond the clinical generates questions that practitioners should consider to guide their own personal practice and understanding of paramedicine.

With a more general approach to critical thinking, we can examine the fundamental questions of paramedicine. We can define the role of a paramedic and what part they play in the health care system. By defining and understanding this role more clearly, we can advocate for the expansion of knowledge or practice within this role without stretching paramedics beyond their intended purpose.

An evolving field of thought in the practice of medicine is effective communication. Looking beyond the question of whether the medical care the patient received was appropriate, we can begin to ask whether we were able to effectively communicate our findings and priorities with our partner, other healthcare providers and our patients.

We can also ask whether an objective, clinical approach is necessary for patient care and what role empathy and personal judgment have in our practice. Two examples in this field include Anthony Correia's exceptional article calling for practitioners to see the patient beyond the medical condition and Justin Porter's article introducing the concept of patient-centered care.

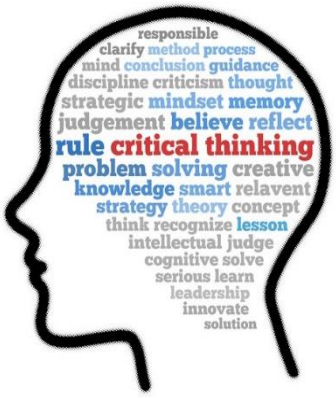
We can also examine interpersonal dynamics in paramedicine. What is an ideal paramedic practitioner? When must a paramedic be a leader and when do they function better as followers? What form of leader is more appropriate for a particular situation? Is a more authoritarian role necessary or is a collaborative leader more effective? Given that EMS requires life-long learning to keep current with developments, should more experienced members be expected to guide newer practitioners? Should newer members also be expected to update older practitioners with evolving approaches and treatments?

Expanding Critical Thinking in EMS Beyond Clinical Thinking
Continued

Ethics and morality can also be examined. Paramedics should question their understanding of beliefs with regards to right and wrong. Does a paramedic's personal ethics have a role to play in their clinical practice? Can they refuse to perform a skill or administer a medication they personally disagree with? If they refuse, should they be obligated to hand over care to another practitioner who is willing to provide said care if the patient requests it? What if the patient is unable to make their own decisions?

How Do We Develop Critical Thinking Beyond Clinical Thinking?

Clinical thinking is easier to develop because paramedics are provided a foundation of knowledge through their schooling and then challenged with various scenarios. Following graduation, articles, podcasts and school materials then enhance or reinforce their clinical knowledge and help to develop their thinking. Developing domain-general critical thinking is more challenging because there may not be any foundational



knowledge to guide further thinking. For many paramedic programs, there is insufficient time to focus on other elements such as philosophy, ethics or leadership dynamics.

It thus falls to practitioners to identify questions and begin to look for information to guide them towards an answer. Observing other approaches and reflecting on their strengths and weaknesses may be the first step. Reaching out to a mentor or asking a partner for their ideas may help guide thoughts on the topic in question. Research may be required to expand one's knowledge on the topic. From there, practice may be needed to determine how best to apply new knowledge or insights.

It is important to note that answers to many of these questions may change to reflect different situations and many of these questions are sufficiently open-ended to allow for multiple solutions. A practitioner's personal beliefs or background will influence their thoughts; each practitioner must develop their own answers based on their perspective.

Why Should We Expand Clinical Thinking to Critical Thinking?

The philosopher David Hume spoke of custom as the main guide of human life. We often behave (or think) in the way we do because we have done so in the past, without reflecting on whether the behavior or thought can be justified by fact or reason. In general, this serves as an effective way to operate, trusting that if it worked in the past, it should be equally effective in future situations.

However, this approach can also imprint stale thoughts or anchor poor practice. For an evolving industry such as paramedicine, complacency of thought or mindset is problematic. We can use critical thinking to, as Dan Ariely says, "inventory the imprints and anchors in our own life. Even if they once were completely reasonable, are they still reasonable? Once the old choices are reconsidered, we can open ourselves to new decisions." Our field is much broader than the clinical problem presented to us when a patient calls 911. Our thinking should be, too.

Article from the 4/13/2021 online edition of JEMS.com authored by Radu Venter.

Judge a man by his questions rather than his answers. *Voltaire*

FDLFR took delivery of the newest addition to the ambulance fleet. Thanks to everyone at North Central Emergency Vehicles and Braun for fast tracking the delivery.

NEWS AT THE STATION

Fond du Lac Fire Rescue bids a fond farewell to Firefighter/ Paramedic **Don Salvaggio** who retires with over 26 years of dedicated service to the City and its residents. Members of the FDLFR's Honor Guard retired the American Flag at station one and presented it to FF/PM Salvaggio by Chief O'Leary. A "KEY TO THE CITY" was presented to Don by Chief O'Leary on behalf of the Fond du Lac City Council. Enjoy your retirement and thank you for your service!

FDLFR is happy to welcome Probationary Firefighter/Paramedic **Noah Lorenz** as our newest member. Following is a little snippet about Noah, from Noah.

My name is Noah Lorenz. I grew up in the city of Fond du Lac. I graduated from Winnebago Lutheran Academy in 2018 and from there went to Fox Valley Technical College to work on my Fire Protection degree. I then received my Paramedic certificate from Moraine Park. I am currently taking classes at Fox Valley Technical College to finish my degree in Fire Protection. In my free time, I enjoy the outdoors, hunting, fishing, and spending time with family and friends. I look forward to spending my career with Fond du Lac Fire/Rescue!

Noah is currently in the midst of his 4-week Recruit Academy which will conclude in mid-May. Thank you to all of the personnel who have helped with his training during the Academy.

Happy May Birthday

Jim Knowles • Jason Roberts • Jack Olstinski
Shawn Kneeland • Max Blitzke • Zach Mueller

Well-trained people are the best defense against fire.

By: Assistant Chief of Training/Safety
James Knowles III

The Flying Standpipe

At the heart of every engine company operation is the hoseline. The primary mission of the engine company is to stretch and advance the hoseline into position and launch an attack on the fire. In most cases, the largest obstacle in the path of the hoseline operation is a stairway that must be ascended. Ascending a stairway and managing the pinch points associated with the stairway are typically easily overcome by the engine company firefighters, and the hoseline operation is performed without fault.

Hoseline-advancement obstacles

One of the simplest methods of advancing a charged hoseline up a stairway is the use of the technique known as building a bow. Building a bow consists of the nozzle firefighter being positioned at the base of the stairway and advancing the hoseline up the stairway in the shape of a bow. This technique is also referred to a rolling the hoseline up the stairway.

To perform this operation, the nozzle firefighter should position the nozzle underneath their knee or foot to ensure that control of the nozzle is maintained throughout the operation. The nozzle firefighter then advances the hoseline up the stairway by guiding it up the wall on the opposite side in which the nozzle firefighter intends to exit the stairway as the backup firefighter feeds hoseline to the nozzle firefighter in the form of slack. The nozzle firefighter can then easily ascend the stairway with the nozzle.

Some building stairways were clearly not designed with firefighting operations in mind. These stairways may be narrow in width and short in the depth of the steps or contain many turns. A commonly used tactic to overcome these obstacles is for firefighters to ascend the stairway without a hoseline to the floor below the fire. The firefighters then drop a utility rope out of a window and down to a firefighter positioned in the street or yard of the building where the utility rope is used to secure the hoseline to be hoisted. The firefighters on the floor below the fire floor then hoist the hoseline up the face of the building and into the building. This tactic limits the number of floors of the stairway that the firefighters must advance the hoseline. The stairway will not always be the largest obstacle in the path of an advancing team of firefighters. Sometimes an extremely long hoseline stretch and advancement operation can be required at a variety of fire scenes. This may be due to the design or location of the building or be required in buildings that may contain damaged or Multi-level structures that do not possess a standpipe system also pose challenges. One example: multi-level parking garages. Most fire apparatus cannot fit into these structures and therefore must remain in the street.

Standpipe solution

The flying standpipe operation is a tactic that can be employed in each of the scenarios to assist firefighters in getting the hoseline into position in a timely and effective manner. The flying standpipe operation is the use of an aerial ladder to provide a water supply for hoseline operations. It can be employed to assist firefighters in getting the hoseline into position in a timely and effective manner. The flying standpipe operation includes the use of a tower ladder that possesses a discharge outlet in the platform. If this type of aerial apparatus is present, a flying standpipe operation can be performed to assist firefighters in getting the hoseline into position.

To perform a flying standpipe operation, the aerial apparatus must be positioned so that the aerial ladder can be raised and positioned in a position where the hoseline stretch and advancement operation can be performed. In the case of a building, this position will be the floor below the fire in a location near a stairway that can be used by the firefighters to access the fire floor.
In the event of a vehicle fire or multiple vehicle fires in a structure such as a parking garage, the proper position for the aerial ladder will be on the fire floor in a position near the location of the fire. This positioning enables firefighters to perform a shorter hose stretch and advancement operation as well as providing an additional means of access and egress to firefighters.

The Flying Standpipe
Continued

Weigh the pros and cons
Like any other operation, firefighters must compare the pros and cons of performing a flying standpipe operation before deciding to employ it. The pros are that the operation provides a water supply for hoseline operations like those mentioned above. It will also provide an additional means of access and egress for firefighters in these situations. The flying standpipe operation can also reduce the strain placed on the limited resources available on the fire scene to transport equipment to the fire area.

On the con side, performing a flying standpipe eliminates the ability of the aerial ladder to be used for other operations including rescue and ventilation. This is of particular importance when fire departments only send a single aerial apparatus to a fire. Anytime a flying standpipe operation is performed, regardless of the number of aerial apparatus that are on scene at the time, an additional aerial apparatus must be requested. The flying standpipe operation should be a last resort tactic when a single aerial apparatus is on scene.

Firefighters must always be prepared to overcome any obstacles that may impede the effectiveness of an operation. The flying standpipe operation is a tactic that can be used to overcome some obstacles to hoseline operations, particularly when accessibility is limited. While the flying standpipe operation will not always be the best option to get the hoseline into position, particularly when the availability of aerial apparatus is limited, the tactic is a great tool that can be very beneficial specifically when access is limited.

Source: *Rowett, A. (2018). The flying standpipe. Firehouse. Retrieved from: https://www.firehouse.com/operations-training/hoselines-water-appliances/article/12381689/the-benefits-of-the-flying-standpipe*

Current Status of New Construction

- River Hills Mixed Use Development on S. Main St. – Buildings 10, 11, 12 are under construction
- Forest Mall – Demolition continues
- Badger Liquor – Warehouse is under construction
- Huberty CPA's on S. Pioneer Rd. – New Construction
- Excel Engineering – New addition
- Country Lane Cottages - Townhouses under construction
- Sullys Tavern – Under Construction
- Holiday Collision Center - Under Construction
- Mid States Aluminum Addition – Nearing Completion
- Parkside, Evans, Sabish Schools – Under Construction

Fire Prevention

The Bureau Never Sleeps

By: Division Chief Garth Schumacher

Staying Safe in a Tornado

To stay safe during a tornado, prepare a plan and an emergency kit, stay aware of weather conditions during thunderstorms, know the best places to shelter both indoors and outdoors, and always protect your head.

Tornadoes continue to impact locations across the country every year, bringing massive winds and destruction in their paths.

The 2020 tornado season claimed the lives of 76 individuals and injured hundreds more. Fifty-one percent of those victims were in a mobile home or trailer park at the time of the tornado. These storms caused billions in damage.

According to the National Oceanic and Atmospheric Agency (NOAA) external icon there is no guaranteed safety during a tornado. Even the possibility of a tornado must be taken seriously. Although the most violent tornadoes can level and blow away almost any house and those within it, extremely violent EF5 tornadoes (those with windspeeds of 200 MPH or more) are rare. Most tornadoes are much weaker. You can survive a tornado if you follow safety precautions.

Here are three important tips to help keep you and your family safe.

1. Be Prepared.
The best way to stay safe during a tornado is to be prepared with the following items:

- Fresh batteries and a battery operated TV, radio, or internet-enabled device to listen to the latest emergency weather information
- A tornado emergency plan including a safe shelter for yourself, your family, people with special needs, and your pets
- An emergency kit (including water, non-perishable food, and medication)
- A list of important information, including telephone numbers

Be sure your children know what a tornado is, what tornado watches and warnings are, what county they live in (warnings are typically issued by county), and what makes a location a safe shelter, whether at home or at school.

2. Stay aware of weather conditions.
To protect yourself and your family from harm during a tornado, pay close attention to changing weather conditions in your area. If you know thunderstorms are expected, stay tuned to local radio and TV stations or an NOAA weather radio for further weather information. Some tornadoes strike rapidly without time for a tornado warning. The following weather signs may mean that a tornado is approaching:

- A dark or green-colored sky
- A large, dark, low-lying cloud
- Large hail
- A loud roar that sounds like a freight train

If you notice any of these conditions, take cover immediately, and keep tuned to local radio and TV stations or to a NOAA weather radio or check the internet.

3. Know where to shelter.
Falling and flying debris causes most deaths and injuries during a tornado. Although there is not completely safe place during a tornado, some locations are much safer than others.

- Go to the basement or an inside room without windows on the lowest floor (bathroom, closet, center hallway).
- If possible, avoid sheltering in a room with windows.
- For added protection get under something sturdy (a heavy table or workbench). Cover your body with a blanket, sleeping bag or mattress. Protect your head with anything available.
- **Do not stay in a mobile home.**

If you are outside or in a mobile home, find a nearby building preferably with a basement. If you are in a car, do not try to outrun a tornado but instead find the nearest sturdy building.

No one can know a tornado's strength before it touches down, so keep up with local weather information, especially when thunderstorms are forecast. Prepare your home and family for the possibility of a tornado. Moving to shelter quickly is easier when everyone knows where to go, whether in your home or outdoors. Following these tips will give you the best chance for staying safe in a tornado.

Be sure you and your loved ones know what makes a safe shelter.

Lightning Safety

Thunder and lightning storms happen all the time. Know what to do to keep you and your family safe when storms strike!

Safety Tips

Outdoor Safety

- **If you can hear** thunder, you are within striking distance of lightning. Look for shelter inside a home, large building, or a hard-topped vehicle right away.
- **Do not go under** trees for shelter. There is no place outside that is safe during a thunderstorm.
- **Wait at least 30 minutes** after hearing the last clap of thunder before leaving your shelter.
- **Stay away** from windows and doors. Stay off porches.
- **There is no safe place outside**. Places with only a roof on sports fields, golf courses, and picnic areas are not safe during a lightning storm. Small sheds should not be used.
- **If a person is struck** by lightning, call **9-1-1**. Get medical help right away.

Indoor Safety

Turn off computers. Stay off corded phones, computers, and other things that put you in direct contact with electricity or plumbing. You **can use** a cell or cordless phone.

Do not wash your hands, bathe, shower, do laundry, or wash dishes.

FAST FACTS

Lightning may strike **as far as 10 miles** from any rain.

NATIONAL FIRE PROTECTION ASSOCIATION
The leading information and knowledge resource on fire, electrical and related hazards

FOND DU LAC FIRE / RESCUE

PEER FITNESS TIPS

By: Peer Fitness Trainer
Jack Prall

Muscle Fiber Types: Fast-Twitch vs. Slow-Twitch

If you watch sports on TV, at some point you've probably heard a commentator talk about an athlete having explosive or powerful muscles. For example, professional football player JJ Watt has received a lot of attention for his off-season conditioning program, which includes flipping a large truck tire. A sportscaster was recently discussing Watt's training techniques and mentioned that Watt was working on his fast-twitch muscle fibers in an effort to become more explosive. At first, this sounds kind of hokey – fast-twitch muscle fibers? Is that really a thing, and is it possible to do certain exercises that focus on one muscle fiber type?

The answers, in short, are yes and yes.

Yes, there are different types of muscle fibers in the body, which are classified based on how they produce energy. Yes, the different muscle fibers can be trained using specific exercises designed to focus on how they create energy or generate force. While a variety of types of muscle fiber has been identified, including type I, type IC, type IIC, type IIAC, type IIA, and type IIX, they are generally classified as being either slow-twitch or fast-twitch.

6 Things to Know About Slow-twitch, or Type I, Muscle Fibers:

1.Slow-twitch fibers contain mitochondria, the organelles that use oxygen to help create adenosine triphosphate (ATP), which is the chemical that actually fuels muscle contractions, and are considered aerobic.

2.Slow-twitch fibers are also called red fibers because they contain more blood-carrying myoglobin, which creates a darker appearance.

3. Because they can provide their own source of energy, slow-twitch fibers can sustain force for an extended period of time, but they are not able to generate a significant amount of force.

4.Slow-twitch fibers have a low activation threshold, meaning they are the first recruited when a muscle contracts. If they can't generate the amount of force necessary for the specific activity, the fast-twitch muscle fibers are engaged.

5. The tonic muscles responsible for maintaining posture have a higher density of slow-twitch fibers.

6.Steady-state endurance training can help increase mitochondrial density, which improves the efficiency of how the body uses oxygen to produce ATP.

As you can see, slow-twitch fibers have specific characteristics for how they function, which means they can be trained to be more aerobically efficient with the proper exercise program.

Techniques for Training Slow-twitch Fibers:

• Exercises that feature sustained isometric contractions with little-to-no joint movement keep the slow-twitch muscle fibers under contraction for an extended period of time. This can help improve their ability to utilize oxygen to produce energy. Examples include the front plank, the side plank and the single-leg balance.

• Resistance-training exercises using lighter weights with slower movement tempos for higher numbers of repetitions (i.e., more than 15) can engage the slow-twitch fibers to use aerobic metabolism to fuel the activity.

• Circuit training, which involves alternating from one exercise to the next with little-to-no rest while using lighter weights, can be an effective way to challenge slow-twitch fibers.

• Body-weight exercises for higher numbers of repetitions can be an effective way to. challenge aerobic metabolism, which helps improve the efficiency of slow-twitch fibers

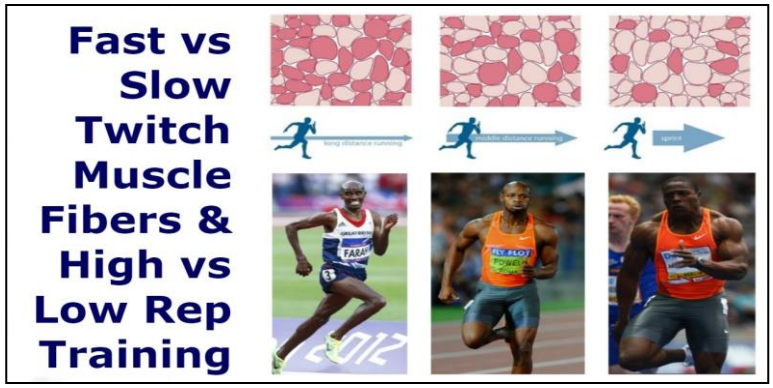
• When working with body-weight only or lighter amounts of resistance, use shorter rest intervals of approximately 30 seconds between sets to challenge the slow-twitch fibers to use aerobic metabolism to fuel the workout.

8 Things to know about Fast-twitch, or Type II, Muscle Fibers:

1.Fast-twitch fibers can be further classified into (1) fast-twitch IIa-fast oxidative glycolytic, because they use oxygen to help covert glycogen to ATP, and (2) fast-twitch type IIb-fast glycolytic, which rely on ATP stored in the muscle cell to generate energy.

2.Fast-twitch fibers have a high threshold and will be recruited or activated only when the force demands are greater than the slow-twitch fibers can meet.

3.The larger fast-twitch fibers take a shorter time to reach peak force and can



Muscle Fiber Types: Fast-Twitch vs. Slow-Twitch
Continued

generate higher amounts of force than slow-twitch fibers.

4. Fast-twitch fibers can generate more force, but are quicker to fatigue when compared to slow-twitch fibers.

5. The phasic muscles responsible for generating movement in the body contain a higher density of fast-twitch fibers.

6. Strength and power training can increase the number of fast-twitch muscle fibers recruited for a specific movement.

7. Fast-twitch fibers are responsible for the size and definition of a particular muscle.

8. Fast-twitch fibers are called “white fibers” because they do not contain much blood, which gives them a lighter appearance than slow-twitch fibers.

As you can see, the characteristics of fast-twitch fibers are more suited for explosive, strength-and power-based sports like football. Therefore, when a announcer talks about how a training program benefits a specific type of muscle fiber, they are being accurate with the science.

If you want to engage more fast-twitch fibers to help you increase strength levels or become more explosive, here are a few specific techniques that work.

Techniques for Engaging Fast-twitch Fibers:

• Resistance training with heavy weight stimulates muscle motor units to activate more muscle fibers. The heavier the weight, the greater the number of fast-twitch fibers that will be recruited.

• Performing explosive, power-based movements, whether it is with a barbell, kettlebell, medicine ball or simply your own body weight, will recruit greater levels of fast-twitch fibers.

• Fast-twitch fibers will fatigue quickly, so focus on using heavy weight or explosive movements for only a limited number of repetitions (e.g., two to six_ for maximum effectiveness.

• Because they deplete energy quickly, fast-twitch fibers require longer rest periods to allow motor units to recover and to replace spent ATP. Therefore, allow at least 60 to 90 seconds of rest after each explosive or strength exercise.

Understanding how the physiology of the body adapts to exercise can help you develop more effective exercise programs for your specific needs. Genetics determines how much of each muscle-fiber type you possess; however, identifying whether you are fast-or slow-twitch dominant would require an invasive muscle biopsy.

Therefore, if you find that you tend to enjoy more endurance-based activities and that they are relatively easy for you, you probably have a greater number of slow-twitch fibers. Conversely, if you really dislike going for long runs, but enjoy playing sports that rely on short bursts of explosive movements, or if you like weight training because it is relatively easy, you are probably fast-twitch fiber dominant. An exercise program that applies the right training strategies for your muscle fibers can help you to maximize the efficiency and enjoyment of your workout time.

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Characteristic	Slow-twitch	Fast-twitch IIa	Fast-twitch IIb
Force production	Low	Intermediate	High
Contraction speed	Slow	Fast	Fast
Fatigue resistance	High	Moderate	Low
Glycolytic capacity	Low	High	High
Oxidative capacity	High	Medium	Low
Capillary density	High	Intermediate	Low
Mitochondrial density	High	Intermediate	Low
Endurance capacity	High	Moderate	Low